

Are The Technical Skills of Junior URL Officers Eroding?

William R. Bowman, USNA
Stephen L. Mehay, NPS

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BACKGROUND

- **Perception is that technical skills of new JO's are eroding.**
- **Number of new Ensigns with technical degrees fell between 1988 and 2001:**
- **Increasing technological sophistication of ships and airplanes suggests demand for technical skills is growing**
- **What is the *required level* of "Technical Knowledge" for JO's in URL?**
- ***The study examines trends in technical backgrounds of JO's, including:***
 - composition in the URL,***
 - source of commissioning***
 - propensity to fill technical billets***
 - on-the-job performance***

Definition of Technical Skills

⇒ We define “Technical Knowledge” in two dimensions to capture the continuum of technical skills and knowledge:

General Technical Knowledge acquired in core mathematics and science courses*

- (a) Cumulative grade point average of 2.20 or higher (i.e., $APC1 \leq 3$), and
- (b) Grade of C+ or better in calculus sequence (i.e., $APC2 \leq 2$), and
- (c) Grade of C+ or better in physics sequence (i.e., $APC3 \leq 3$).

Specific Technical Knowledge acquired via major in:

- (a) Engineering
- (b) Architecture
- (c) Physical Sciences
- (d) Mathematics, Operations Analysis, etc.
- (e) Computer Sciences, Information Technical, etc.

*NOTE: *These are the minimal technical core requirements set by the Naval Postgraduate School for Navy-sponsored technical graduate degree programs.*

Trends in technical majors and skills

- Percent of URL Ensigns with tech *major* rose between 1978-1989 (50% to 60%), but fell slightly between 1989-2001
- Percent of URL Ensigns with strong tech *skills* ($APC \leq 323$) rose 1977-1997 from 40% to 50%
- 80% of those with strong tech skills also have a tech major
 - 90% of submariners have strong tech skills
 - Percent of aviators and SWO with strong tech skills rose from 30% to 40%

Analytical Approach

⇒ Estimate statistical models of the impact of “Technical Skills” on JO career milestones:

- Probability of Completing Nuclear Power Training
- Continuation Rates
- Graduate education acquisition
- Lateral Transfer to AEDO or CEC
- Attainment of SWO Qualification
- Job Performance (based on fitreps)
- Promotion Probability to O-4

Technical Skills and Nuclear Power Training

- **No trend in nuclear-qualified JO's successfully complete nuclear training. However, percent of technical JO's choosing nuclear power option has fallen (from 45% to 30%).**
- **Since 1992 USNA has graduated about same number of nuclear-trained JO's, while NROTC and OCS have graduated far fewer.**
- **Those with strong technical skills are 30% more likely to become nuclear power qualified. This effect is increased another 10%-points if one has technical major.**
- **Given strong technical skills:**
 - **NROTC graduates are slightly less likely than USNA to complete nuclear power training**
 - **OCS graduates are more likely to become nuclear power trained (than USNA graduates).**

Effect of Technical Skills on Retention and Lateral Transfers

- **Graduates with strong technical skills are slightly less likely (4%) to stay to O-4**
- **A technical degree has no additional effect on retention.**
- **NROTC and OCS graduates of highly selective colleges are 10% and 20%, respectively, less likely to stay (than USNA graduates).**
- **Prior enlisted are roughly 30% more likely to stay.**
- **JO's with strong technical skills are more likely (5-8%) to laterally transfer into EDO-CEC communities. JO's who also have technical major are an additional 6% more likely to transfer**

Technical Skills and Sponsored Technical Graduate Education

- **Percent completing technical M.S. rose from 10% to 20% during '77 - '84, leveled off through '87, and fell thereafter.**
- **JO's with strong technical *skills* are 10%-15% more likely to complete a technical M.S. - those with a technical *major* are an additional 10% more likely to acquire a technical M.S.**
- **Given one's technical degree or skills, neither commissioning source nor college quality affects likelihood of a technical M.S.**

Technical Skills and SWO Qualification

- **The major split in time to earning one's SWO Pin is between one to two years after being assigned to a ship.**
- **Those with “strong” technical skills are 10% more likely to earn SWO pin in first year (if they have a technical major).**
- **On average, OCS grads take two to three months longer to earn their SWO Pin (compared to USNA graduates).**
- **Those earning SWO Pin in the first year are 10% more likely to promote to LCDR than those earning their pin later.**
 - Time-to-qualify appears to indicate greater productivity on-the-job.**

Technical Skills and Job Performance

- **JO's with strong general technical skills receive better fitness reports in all career stages -- years 1-3 (as O-1/O-2) -- and years 4-10 (as O-3)**
- **JO's with strong general technical skills are 2% to 3% more likely to earn superior fitness reports, regardless of major**
- **Given technical skills, technical *major* has no effect on early career fitness reports and a small negative effect on O-3 fitreps**
- **NROTC and OCS graduates receive from 3%-5% fewer superior O-3 fitreps as O-1/O-2, and 5%-10% fewer as O-3 (compared to USNA grads)**
- **NROTC and OCS grads from highly selective colleges have comparable performance to USNA grads on early career ₁₀ fitreps.**

Technical Skills and Promotion

- JO's with “strong” general technical *skills* who stay are 4% more likely to promote to O-4. This “promotion premium” seems relatively small given the perceived need for such technical skills in today's Navy.
- It is also surprising that the specific knowledge from a technical major (given general tech skills) does not affect promotion in URL.

SUMMARY AND CONCLUSIONS

- **The observed decline in the number of technically trained JO's reveals that:**
 - The number of officers with a technical degree varies with overall force structure. Over the last 30 years, the percentage of O-1 and O-2's with a technical degree has remained constant.
 - Moreover, percent of Ensign's with strong general technical skills has grown over the last 20 years
- **JO's with strong general technical skills are:**
 - More likely to choose nuclear power
 - More likely to earn technical graduate degree
 - Have slightly higher performance scores
 - Have slightly higher promotion rates to O-4

SUMMARY & CONCLUSIONS

⇒JO's with technical major:

- Increase chances of acquiring a technical graduate degree
- Are more likely to laterally transfer to (aviation) engineering duty officer community or civil engineering corps
- Earn SWO qualification faster.

⇒JO's with general and/or specific technical knowledge are slightly less likely to continue on active duty.

⇒If URL community managers wish to expand the numbers of JO's with technical skills, will need special recruiting efforts to attract individuals from more selective colleges, especially minorities and females.

RECOMMENDATIONS

- Provide bonus to OCS graduates with minimal technical skills (APC \leq 3-2-3)
- Provide Grad-Ed brief to all seniors at USNA and VTC brief to NROTC grads
- Offer technical remediation courses prior to being sent to NPS for technical graduate education
- Additional resources must be directed to identify the technical skills of the URL officers entering the fleet each year.

BACK-UP SLIDES

Data Issues

- Problems with missing information
 - Missing undergrad major
 - USNA about 5%
 - NROTC missing 15% in 1988, 30% in 2001
 - OCS missing 25% in 1988, 80% in 2001
 - Missing APC (general tech skills)
 - USNA about 5%
 - NROTC missing 18% in 1988, 26% in 2001
 - OCS missing 20% in 1988, 95% in 2001

Predictors of “Strong” Technical Skills

- NROTC & OCS graduates are 10% - 25% less likely to have strong technical skills (compared to USNA).
- Graduates of highly selective colleges are 2-3 times as likely to have strong technical skills as those from less competitive colleges.
- Prior enlisted are 20% more likely to have strong technical skills
- Minorities are 10% less likely to have strong technical skills compared to majority JO's.